(Translation)

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[Specification]
[Title of the Invention] POLYIMIDE RESIN MULTILAYER INTERCONNECT SUBSTRATE

[Claims]
1. In a polyimide resin multilayer interconnection substrate, in which a conductive wiring layer and an insulating layer of polyimide resin are alternately laminated, the polyimide resin multilayer interconnect substrate is characterized in that an insulating layer between a signal layer and a ground layer is configured with a low dielectric constant polyimide resin.
2. The polyimide resin multilayer interconnect substrate according to claim 1, characterized in that the insulating layer with a low dielectric constant polyimide resin and an insulating layer with normal dielectric constant polyimide resin are alternately laminated.

[Detailed Description of the Invention]
(Industrial applicability)
The present invention relates to a polyimide resin

multilayer interconnect substrate used for an electronics device.

[Prior Art]

Conventionally, a polyimide resin multilayer interconnect substrate is configured with a conductor wiring layer and a polyimide resin insulation layer alternately laminated on a ceramic multilayer interconnect substrate. The polyimide resin insulation layer is generally configured by using a polyimide resin having a dielectric constant of about 3.4 to 3.8.

That is, as shown in Fig. 2, on a ceramic or glass ceramic multilayer interconnect substrate 21, on a power layer 23 formed by a conductor wiring 22, an insulation layer 25 having via holes 24, a ground wiring layer (hereinafter, referred to as GND) 26, an insulation layer 25, a signal wiring layer 28, an insulation layer 25 are sequentially laminated, and finally a power/signal interchange layer 29, an insulation layer 25 and an electric component mounting layer 30 are formed to configure a multilayer interconnection substrate.

[Problems to be Solved by the Invention]

A conventional polyimide resin multilayer interconnection substrate as described above is formed with alternately laminated conductor wiring layer and polyimide resin insulation layer on a ceramic multilayer interconnection substrate, and the polyimide resin insulation layer is configured with an insulation layer using PIQ of Hitachi Chemical, PYRALYN of DuPont, Semicofine of TORAY and the like for non-photosensitive polyimide, and PL-1200 of Hitachi Chemical, PI-2702D of DuPont, Photoneece of TORAY, PIMEL of Asahi Kasei

and the like for photosensitive polyimide.

A dielectric constant which affects the propagation speed of a signal in wiring is 3.4 to 3.8 in a general polyimide which is said as being a preferable material as the electric material. If higher propagation speed is to be realized by reducing a dielectric constant, a lower dielectric constant of polyimide is required to be used. Currently, polyimides with a dielectric constant having a level of 2.7 to 3 are provided by the above-described manufacturers. However, when using the low dielectric constant material to form a multilayer wiring, a problem arises in which an adhesion between polyimide and polyimide is weak. This is, because F (fluorine) is added to a polymer, the reactivity is weak, or a polymer structure is a rigid rod-like structure; therefore, when forming a multilayer with only this material, an adhesion between polyimide and polyimide becomes weak, so this material is not suitable for an insulation material of a multilayer interconnect substrate.

[Means for Solving the Problem]

In the present invention, in a polyimide resin multilayer interconnect substrate which is formed by alternately laminating a conductor wiring layer and an insulation layer of polyimide resin, an insulation layer between a signal layer and a ground layer is configured with a low dielectric constant polyimide resin.

In addition, in the polyimide resin multilayer interconnect substrate of the present invention, the insulation layer of the low dielectric constant polyimide resin and a normal dielectric constant polyimide resin are alternately laminated.

[Embodiments of the Invention]

Next, the present invention will be explained with reference to the Figures.

Figure 1 is a vertical cross-sectional view of one embodiment of the present invention.

In Figure 1, conductive wiring 2 such as copper or gold and the like forms a power layer 3 with a thickness of 5 microns to 10 microns and a line width of 15 microns to 30 microns by a plating method and the like on a ceramic or glass ceramic multilayer interconnect substrate, then normal insulation layer 5 of a polyimide resin (PIQ of Hitachi Chemical, PYRALYN of DuPont, Semicofine of TORAY and the like for non-photosensitive polyimide, and PL-1200 of Hitachi Chemical, PI-2702D of DuPont, Photoneece of TORAY, PIMEL of Asahi Kasei and the like for photosensitive polyimide) having via holes 4, with a thickness of 15 microns to 25 microns is formed on the substrate. After that, a GND wiring layer 6 is formed on the insulation layer by a plating method and the like as described above. Then, low dielectric constant polyimide (PIQ-900, PIQ-1800X-5 of Hitachi Chemical, PI-2566, PI-2610D, PI-2611D of DuPont, TLSA(A) of Asahi Kasei and the like for non-photosensitive polyimide, and TL(E) of Asahi Kasei and the like for photosensitive polyimide) is used to form an insulation layer 7 with a thickness of 15 microns to 25 microns having via holes 4 thereon. Next, a signal wiring layer 8 is formed by a plating method and the like similar to the above and then a normal insulation layer 5 (PIQ of Hitachi Chemical, PYRALYN of DuPont, Semicofine of TORAY and the like for non-photosensitive polyimide, and PL-1200 of Hitachi Chemical, PI-2702D of DuPont, Photoneece of TORAY, PIMEL of Asahi Kasei

and the like for photosensitive polyimide) having via holes 4, of polyimide resin with a thickness of 15 microns to 25 microns. Following this, by the above-describe process, a signal wiring layer 8, a low dielectric constant polyimide insulation layer 7, a GND layer 6, a normal polyimide resin insulation layer 5, a power/signal interchange layer 9, normal polyimide resin insulation layer 5, and an electric parts mounting layer 10 are further formed in this order to obtain a multilayer interconnection substrate.

In the structure of the present embodiment, since a low dielectric constant polyimide insulation layer 7 and a normal polyimide insulation layer 5 are alternately laminated, the problem of weak adhesion between polyimide layers when only using a low dielectric constant polyimide is improved. In addition, a wiring delay of signal is determined by a dielectric constant with a ground layer; therefore, by using a low dielectric constant material for the portion, an electrical property of a wiring substrate is improved.

[Effect of the Invention]

As described above, according to the present invention, in a polyimide resin multilayer interconnection substrate which alternately laminates a conductive wiring layer and an insulating layer of polyimide resin, by forming an insulation layer between a signal layer and a GND layer with a low dielectric polyimide resin, a dielectric constant is reduced to between 2.7 and 3.0 level to increase a signal propagation speed, compared to an insulation layer configured with a general polyimide resin insulation layer of dielectric constant of 3.4 to 3.8. In addition, by using a low dielectric constant

polyimide only between a signal layer and a GND layer, the drawback of the material that when using it for a multilayer wiring, it is not suitable for use as an insulation layer of a multilayer interconnection substrate because of weak adhesion between polyimide and polyimide, is solved.

[Brief Description of the Drawings]

Figure 1 is a vertical cross sectional view of one embodiment of the present invention; Figure 2 is a vertical cross sectional view of an example of conventional polyimide resin multilayer interconnection substrate.

1, 21 ... ceramic or glass ceramic multilayer interconnection substrate; 2, 22 ... a conductor wiring; 3, 23 ... a power layer; 4, 24 ... via holes; 5, 25 ... an insulation layer; 6, 26 ... GND wiring layers; 7 ... insulation layers using low dielectric constant polyimide; 8, 28 ... signal wiring layers; 9, 29 ... a power/signal interchange layer; 10, 30 ... an electric parts mounting layer.

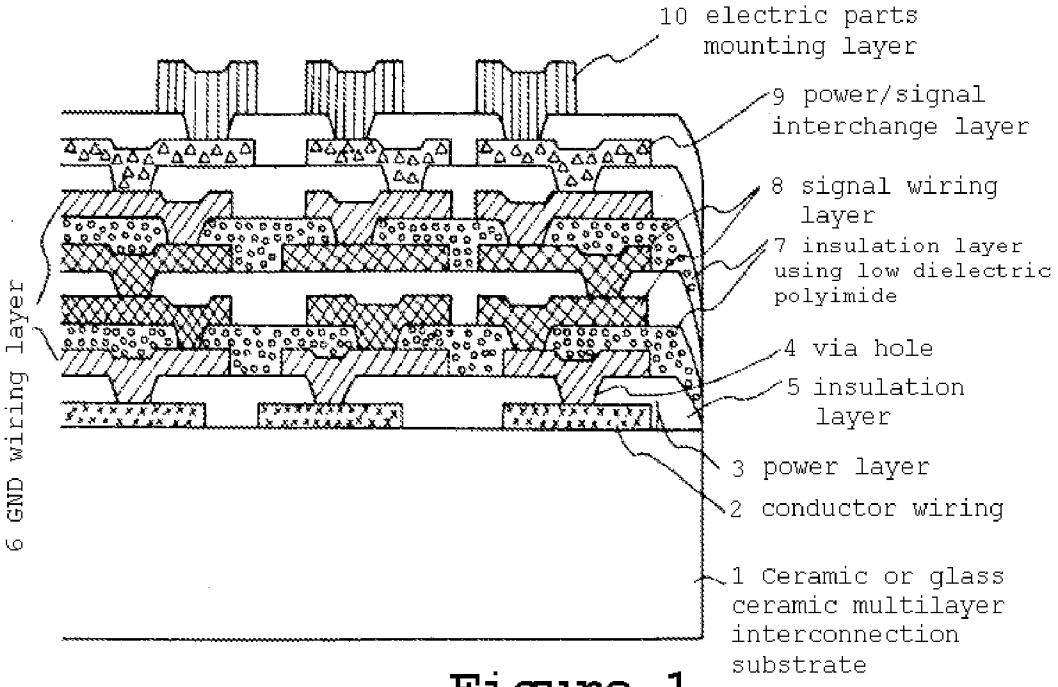

Figure 1

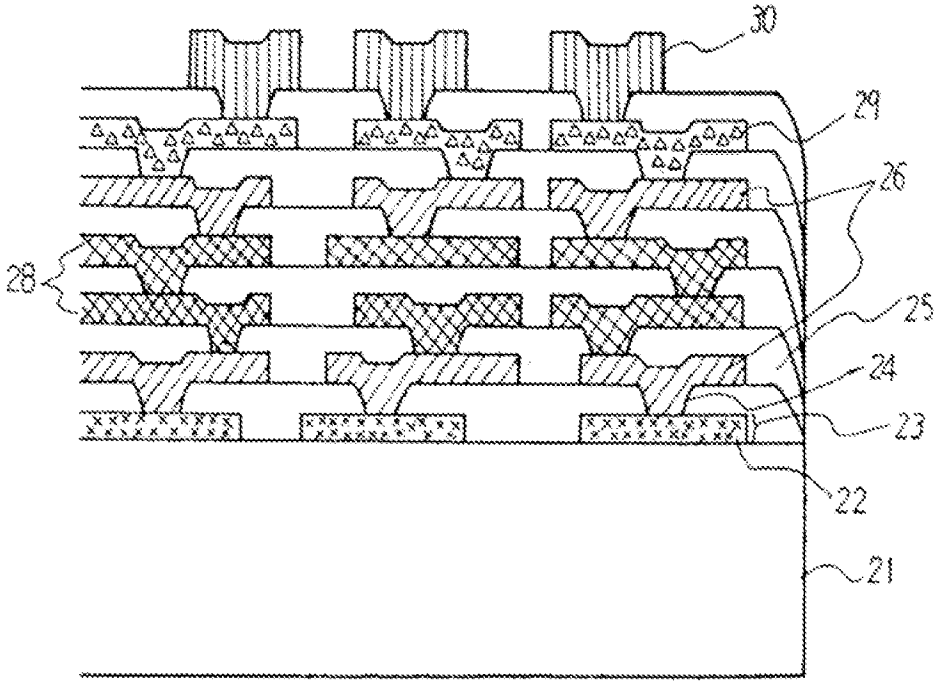

Figure 2